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Summary of Catch and Effort Statistics by Subarea and Assessment Unit for the Northern Labrador Arctic Charr Fishery in 1987

by

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Abstract

Catch and effort statistics for the northern Labrador Arctic charr fishery in 1987 are summarized. Total northern Labrador landings of 107 t were 6% lower than 1986 landings and 45% below the previous 10-year mean of 195 t. Within the Nain Fishing Region, the TAC was obtained in two out of three assessment units (Voisey and Nain), although only 45% of the TAC was taken in the Okak unit and this contributed to the overall lower catch in 1987. Reduced effort continues to be the single most important factor associated with decreased landings in comparison with earlier years. The Voisey, Nain, and Okak assessment units contribute approximately 85% of the total catch from the Nain Region. With the present level of TAC for these units at 107 t, a 60% increase in effort in conjunction with an expansion of the fishery into northern fiord subareas will be required in order to achieve average catch levels recorded during the past 10 years.

Résumé

L'étude résume les statistiques sur les prises et l'effort de la pêcherie d'omble chevalier dans le nord du Labrador en 1987. Le total des débarquements, soit 107 t, était inférieur de 6 % à celui de 1986 et se trouvait 45 % au-dessous de la moyenne des dix années précédentes (195 t). Dans la région de pêche de la Nain, le TPA a été atteint dans deux des trois unités d'évaluation (Voisey et Nain), mais 45 % seulement du TPA a été capturé dans l'unité de l'Okak, ce qui a causé la baisse globale des prises en 1987. La réduction de l'effort reste le premier facteur de la baisse des débarquements par rapport aux années précédentes. Les unités d'évaluation de la Voisey, de la Nain et de l'Okak rapportent environ 85 % des prises totales de la région de la Nain. Le TPA actuel de ces unités étant fixé à 107 t, il faudra augmenter de 60 % l'effort et développer la pêche dans les sous-zones des fjords du nord pour retrouver les niveaux moyens de prises des dix années précédentes.

Introduction

Continuous records of commercial landings of anadromous Arctic charr (Salvelinus alpinus) from the northern Labrador coast are available since 1944. Catch statistics from the Nain and Makkovik Fishing Regions and from subareas within the Nain Fishing Region (Fig. 1) exist since 1974. From 1977 to 1982 more than 200 $t \cdot y^{-1}$ of Arctic charr were caught in northern Labrador but during the past five years (1983-87) annual landings have averaged only 137 t. The highest landings on record were 252 t in 1981, while the lowest during the past 30 years were 54 t in 1975. This paper summarizes catch statistics for the 1987 fishery and updates previous reports (Dempson 1982; LeDrew and Dempson 1982; Dempson et al. 1985, 1986, 1987) which have examined landings in the commercial fishery.

Methods

Information on the commercial landings of Arctic charr in Labrador was obtained from Program Coordination and Economics Branch of the Department of Fisheries and Oceans. Purchase slips, prepared by Economics, were issued to buyers and were filled out at the time of catch receipt. Information requested included the name of the fisherman, license number, area where fish were caught, date, number of nets used, weight of fish landed and total number of fish caught. Landed catches were converted to round weight (in kilograms) using the conversion factor: gutted head-on weight x 1.22 = round weight (Dempson 1984). Catch per unit effort estimates were derived following the method initiated by Coady and Best (1976) and are expressed in terms of kilograms per man-weeks fished.

Estimates of ice concentration along the northern Labrador coast were obtained from ice charts produced by Atmospheric Environment Service, Ice Forecasting Central, Ottawa. The area of ice was determined by week within the area defined between 55°N and 60°N latitude inside of a line running northwest from 55°00'N, 59°00'W to 60°00'N, 63°00'W (Fig. 1).

Results and Discussion

Total northern Labrador landings

Figure 2 illustrates the commercial landings of Arctic charr from 1944 to 1987. Also illustrated are the landings from the Nain and Makkovik Fishing Regions from 1974 to 1987. During the past 14 years, the Nain Region produced about 85% of the total northern Labrador charr catch. Landings in 1987 totaled 107 t and were 6% lower than the previous year and 45% below the previous 10-year mean (195 t, 1977-86). Individually, landings in the Nain Region of 97 t were only 3% lower than in the previous year while effort decreased by 4%, resulting in a slight increase in catch per unit effort over last year (3%), but a 9% increase since 1985. The highest landings in the Nain Region occurred in 1981 and were 231 t. Since then catch has declined by 58% while effort has decreased by 42%. Charr landings in the Makkovik Region in 1987 were only 10 t, a drop of 28% from 1986. Landings of Arctic charr in the

Makkovik Region have fallen sharply since 1982 (75% decrease) and this was the lowest catch recorded since 1975. Limited information is available on the Arctic charr stocks in this region. Populations are assumed to be small, at least in comparison with more northern areas. Substantial differences in size and age characteristics may exist among local stocks, for example in the Bay of Islands area, as evidenced by an earlier study of gillnet selectivity (Black et al. 1985). In general, size distribution of the catches appears smaller than in the Nain Fishing Region, although allowable minimum mesh size of nets (127 mm) is larger.

Catch and effort data - Nain Fishing Region assessment unit summary

Appendix 1 provides an updated summary of catch and effort statistics for all subareas within the Nain Fishing Region from 1974 to 1987. These subareas form component parts of larger assessment or stock units. The rationale for the formation and derivation of these stock units has been presented in earlier reports (Dempson et al. 1986; Dempson and Kristofferson 1987). As indicated during the past two years (Dempson et al. 1986, 1987), there has been a trend for increasing catches of charr in the offshore zones for the Voisey and Nain assessment units, and decreasing catches of charr in the offshore Okak zone. This trend continued in 1987 for the Nain unit only. Only 20% of the charr catch in the Okak unit was taken in the offshore zone, the lowest recorded (Table 2). Catches of Arctic charr in the Voisey unit represented 22% of the total for the Nain Fishing Region, up from 17% in 1986. The Nain unit continued to be the most important, contributing 47% of the total catch (Table 2).

Table 2 summarizes catch and effort data for the Voisey, Nain, and Okak assessment units, from 1974 to 1987. With respect to the Voisey assessment unit, highest catches occurred during the late 1970s as did the highest catch per unit of effort (CUE). Since 1979 both catch and CUE have varied with the lowest CUE in 1984 and 1986. Landings in 1987 were 21.2 t, an increase of 28% from 1986, and ended up exceeding the TAC allocated for this assessment unit by 25%. Effort increased by 23% and catch per unit effort by 3% from 1986. The Voisey assessment unit was closed to fishing on July 27, 1987. Average landings from the Voisey unit over the past five years (1983-87) have been 20.1 t with a coefficient of variation (CV) of 20%.

Landings from the Nain assessment unit totaled 46 t, essentially achieving the 47 t TAC for this unit. This represented an increase in catch of 24% over 1986 and the highest catch from this unit since 1983. Effort increased by 8% and CUE by 14% from the previous year. Catch per unit effort has increased in each of the past four years in spite of the fact that proportionately more of the catch is being taken in the offshore island zone, historically an area where CUE has been lower than in the inshore fishing subareas. This assessment unit is regulated by quotas applied to specific inshore fishing subareas only. The Webb Bay subarea was the only subarea which had the specified TAC taken (Appendix 1). The Dog Island subarea recorded its highest catch and CUE, with the Black Island subarea recording the second highest CUE since 1974. This was the second year in a row that more than 50% of the catch from this assessment unit originated in the offshore zone. Average landings from the Nain

assessment unit over the past five years (1983-87) have been 43 t with a coefficient of variation of 13%.

Landings from the Okak assessment unit totaled 20 t and were only 46% of the allocated TAC for this unit. Effort decreased by 22% and catch per unit effort declined by 13% from the previous year. Average landings from the Okak assessment unit over the past five years (1983-87) have been 30 t with a coefficient of variation of 42%. This was the highest CV for the three assessment units and possibly reflects the greater variability associated with fishing in the more distant northern areas.

Factors influencing commercial landings in 1987

Since 1981, landings of Arctic charr in the Nain Fishing Region have decreased by over 50%. The high catches and catch rates in 1981 and 1982 were influenced to a large extent by the fishery which occurred in several of the northern fiord subareas. During 1981 and 1982 the fishery in these northern subareas accounted for 30% and 44% of the total landings within the Nain Fishing Region. Since then effort has also decreased by 42%. Abundance of fish, as indicated by catch per unit of effort, however, has increased over the past several years.

While ice conditions along the northern Labrador coast (Table 3) have influenced fishing patterns over the past several years, reduced effort still remains the single most important factor associated with decreased landings in comparison with earlier years. Effort would have to increase from the present level of about 500 units by 60% to 800 man-weeks in order for the Nain Fishing Region landings to reach 165 $t \cdot y^{-1}$, the average catch during the past 10 years (1977-86). With the existing quotas applied to the three assessment units in 1987, maximum allowable catch is 107 t - 81% of this, or 87 t, was obtained in 1987 with the remaining 10 t caught in subareas outside of the three stock units. These assessment units contribute approximately 85% of the total catch from the Nain Region. Clearly expansion of the fishery into more northern fiord subareas, similar to the fisheries in 1981 and 1982, will be required in order to achieve previous catch levels.

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Table 1. Summary of northern Labrador Arctic charr landings (kg round) by fishing region, 1974-86.

	Nain Fishing Region				Makkovik Fishing Region			
Year	Catch	No. of fishermen	Fathoms of gear licensed	Catch as % of total	Catch	No. of fishermen	Fathoms of gear licensed	Total catch
1974	120,414	66		81	28,133			148,547
1975	44,118	85		82	9,542			53,660
1976	134,898	101		90	15,645			150,543
1977	186,165	128		88	24,205			210,370
1978	213,915	131	21,340	86	34,387	149	29,300	248,302
1979	175,263	142	21,320	82	37,693	110	21,225	212,956
1980	167,991	128	23,960	83	35,561	154	30,635	203,552
1981	231,221	122	21,700	92	20,733	154	30,990	251,954
1982	203,012	118	23,600	84	39,163	141	28,200	242,175
1983	149,732	119	24,400	84	29,100	148	29,600	178,832
1984	123,045	115	23,000	83	24,792	147	29,400	147,837
1985	107,120	95	19,000	76	33,945*	132	26,400	141,065
1986	99,963	79	15,800	88	13,888	109	21,800	113,851
1987	97,379	72	14,400	91	9,965	130	26,000	107,344

*Includes 6,788 from spring fishery in Postville area.

Table 2. Catch and effort statistics for the Voisey, Nain and Okak assessment units from 1974 to 1987. Quota area catch (QAC) refers to the landings from those subareas specifically under quota regulation only prior to the derivation of assessment units in 1986.

Assessment unit	Year													
	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Voisey														
Quota[1]						22,500	22,500	16,100	16,100	16,100	16,100	23,400	20,000	17,000
QAC						21,880	11,557	16,325	2,688	2,953	8,113			
Catch	29,180	3,727	14,652	24,108	36,991	40,590	19,694	23,810	13,309	25,593	20,873	15,648	16,655	21,242
Effort			57	75	102	116	82	90	60	80	101	57	82	101
C/E			257	321	363	350	240	265	222	320	207	275	203	210
% Offshore	31	94	21	9	11	47	42	33	45	89	62	91	82	41
Unit as % of Nain Region Total	24	8	11	13	17	23	12	10	7	17	17	15	17	22
Nain														
Quota[2]						61,000	61,000	37,160	43,660	51,000	43,200	30,500	43,000	47,000
QAC						52,832	50,176	37,223	39,119	19,102	29,063	36,019		
Catch	37,745	33,830	53,313	76,255	73,763	66,844	75,055	65,632	55,617	51,202	38,900	41,158	37,095	45,872
Effort			196	291	314	336	390	278	235	289	244	252	185	200
C/E			272	262	235	199	192	236	237	177	159	163	201	229
% Offshore	18	8	5	7	4	18	30	24	22	34	37	48	56	61
Unit as % of Nain Region Total	31	77	40	41	34	38	45	28	27	34	32	38	37	47
Okak														
Quota[3]								27,300	27,300	21,000	27,000	27,000	42,000	43,000
QAC								11,049	9,031	30,732	13,864	24,746		
Catch	46,891	5,057	25,338	42,392	76,024	43,261	49,035	47,541	34,171	48,978	18,146	33,261	28,896	19,649
Effort			148	243	352	283	253	202	186	286	94	208	172	134
C/E			171	174	216	153	194	235	184	171	193	160	168	147
% Offshore	27	53	30	37	54	41	66	78	75	39	25	26	30	20
Unit as % of Nain Region Total	39	11	19	23	36	25	29	21	17	33	15	31	29	20

[1] Quota applied only to Voisey Bay subarea for 1979 to 1984.
[2] Quota applied only to Anaktalik Bay and Tikkoatokak Bay for 1979 to 1983 (1983 also includes 5 t for Nain Bay) but includes an offshore component for 1984 to 1985.
[3] Quota applied only to Okak Bay subarea for 1981 to 1985.

Table 3. Summary of the area of ice coverage (square kilometers) along the Labrador coast between 55° and 60° latitude, 1979-87.

	Year								
Week	1979	1980	1981	1982	1983	1984	1985	1986	1987
June 11-17	28,056	43,304	43,304	43,304	43,304	23,380	43,304	22,045	43,304
June 18-24	35,646	7,590	25,345	43,304	43,304	43,304	43,304	23,606	33,972
June 25-1	6,370	6,912	13,012	41,745	43,304	34,290	32,632	28,093	40,897
July 2-8	15,993	0	0	13,893	6,912	32,054	30,785	8,584	35,464
July 9-15	20,737	0	0	2,711	19,449	31,716	26,475	5,853	23,892
July 16-22	2,575	0	0	542	22,364	28,869	24,218	195	18,478
July 23-29	1,220	0	0	407	22,228	26,497	14,161	0	1,494
July 30-5	0	0	0	609	11,317	1,694	2,258	0	0
Total	110,597	57,806	81,661	146,515	212,182	221,804	217,137	88,376	197,481

APPENDIX 1, ARCTIC CHARR CATCH STATISTICS, 1974-1987.
SUMMARY OF CATCH, EFFORT AND SIZE COMPOSITION

AREA=ANTONS

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	198
QUOTAS														
CATCH (KG)	9135	3489	3172	2111	4011	19371	8460	7870	6191	23062	13099	14212	13589	861
EFFORT (MAN-WKS)	34	20	6	20	17	63	32	38	24	63	82	51	67	5
C/E (KG)	269	174	529	106	236	307	264	207	258	366	160	279	203	15
% > 2.3 KG			21	24	28	22	14	13	12	9	7			

AREA=VOISEY BAY

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	198
QUOTAS						22500	22500	16100	16100	16000	16000	23400		
CATCH (KG)	20045	238	12232	22488	33597	21880	11557	16325	7688	2953	8113	1435	3065	1263
EFFORT (MAN-WKS)	64	2	45	56	85	59	52	53	38	17	24	6	22	5
C/E (KG)	313	119	272	402	395	371	222	308	202	174	338	239	139	23
% > 2.3 KG			42	35	34	32	17	16	17	17	16			

AREA=ANAKTAKLIK BAY

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	198
QUOTAS						21500	21500	8660	8660	11000	6100	8400		520
CATCH (KG)	7821	2548	14670	21604	13075	14913	8045	9157	10836	2359	3980	7477	180	200
EFFORT (MAN-WKS)	28	10	45	63	55	76	53	32	27	24	34	39	7	1
C/E (KG)	279	255	326	343	238	196	152	286	401	98	117	192	26	11
% > 2.3 KG			36	38	27	20	12	10	11	11	12			

AREA=DOG ISLAND

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	198
QUOTAS														
CATCH (KG)	2659	653	212	2039	386	1440	3048	1516	1105	6858	6666	6882	3289	1688
EFFORT (MAN-WKS)	38	40	11	49	25	61	86	37	38	62	66	62	32	8
C/E (KG)	70	16	19	42	15	24	35	41	29	111	101	111	103	19
% > 2.3 KG			11	9	8	15	11	14	7	8	10			

AREA=NAIN BAY

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	198
QUOTAS										5000				
CATCH (KG)	12461		3119	8464				5450	85	532	1886	2667	6437	380
EFFORT (MAN-WKS)	37		10	28				29	1	8	15	32	39	1
C/E (KG)	337		312	302				188	85	67	126	83	165	25
% > 2.3 KG			16	15				4		2	6			

SUMMARY OF CATCH, EFFORT AND SIZE COMPOSITION

AREA=TIKKOATOKAK BAY

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
QUOTAS						39500	39500	28500	35000	35000	26000	12500		15500
CATCH (KG)	9960	27695	31568	39483	55061	37919	42131	28066	28283	16211	8618	6243	3841	3608
EFFORT (MAN-WKS)	28	76	81	94	147	108	130	80	75	65	43	24	16	12
C/E (KG)	356	364	390	420	374	351	324	351	377	249	200	260	240	301
% > 2.3 KG			19	20	18	14	10	5	7	8	5			

AREA=WEBB BAY

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
QUOTAS														8400
CATCH (KG)	580	833	4550	2516	3472	3035	3008	8100	4607	15055	10476	5143	5890	8424
EFFORT (MAN-WKS)	1	5	15	21	16	9	8	29	27	56	43	35	34	27
C/E (KG)	580	167	303	120	217	337	376	279	171	269	244	147	173	312
% > 2.3 KG			21	19	20	39	39	27	11	5	7			

AREA=BLACK ISLAND

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
QUOTAS														
CATCH (KG)	4264	2101	2725	3389	2966	10632	20051	14413	11602	11028	7913	12750	17458	11151
EFFORT (MAN-WKS)	60	62	48	65	81	92	130	94	79	87	62	68	72	50
C/E (KG)	71	34	57	52	37	116	154	153	147	127	128	188	242	223
% > 2.3 KG			8	10	14	7	6	7	8	4	5			

AREA=KIGLAPAITS

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
QUOTAS														
CATCH (KG)	5131	1504	6089	5435	12097	17606	16543	21911	8326	20625	11431	6184	6983	1620
EFFORT (MAN-WKS)	26	32	59	57	103	120	95	99	34	103	55	41	55	14
C/E (KG)	197	47	103	95	117	147	174	221	245	200	208	151	127	116
% > 2.3 KG			25	25	34	14	18	12	16	12	9			

AREA=TASIUYAK

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
QUOTAS														
CATCH (KG)	1467		281		2280	1837	1137		1060	1259	3423	4724	6749	8997
EFFORT (MAN-WKS)	15		2		9	11	8		6	7	23	36	26	61
C/E (KG)	98		141		253	167	142		177	180	149	131	260	147
% > 2.3 KG			21		71	34	14		11	13	5			

APPENDIX 1, ARCTIC CHARR CATCH STATISTICS, 1974-1987.
SUMMARY OF CATCH, EFFORT AND SIZE COMPOSITION

AREA=MUGFORD

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
QUOTAS										15				
CATCH (KG)			1970	1374	1148	170	513			1				
EFFORT (MAN-WKS)			15	9	7	2	5			15				
C/E (KG)			131	153	164	85	103							
% > 2.3 KG			30	36	32	16	15							

AREA=OKAK BAY

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
QUOTAS								27300	27300	21000	27000	27000		25200
CATCH (KG)	34250	2354	17812	27592	36125	26171	17434	11049	9031	30732	13864	24746	20141	15695
EFFORT (MAN-WKS)	105	15	52	107	104	123	65	46	26	147	30	119	91	71
C/E (KG)	326	157	343	258	347	213	268	240	347	209	462	208	221	221
% > 2.3 KG			29	26	18	11	8	10	7	7	2			

AREA=CUTTHROAT

	1974	1975	1976	1977	1978	1979	1980	1981	982	1983	1984	1985	1986	1987
QUOTAS														
CATCH (KG)	12641	2703	7526	15488	41146	17803	32397	37263	25699	19043	4570	8515	8756	3954
EFFORT (MAN-WKS)	95	47	103	130	267	161	205	172	164	164	65	106	89	70
C/E (KG)	133	58	73	119	154	111	158	217	157	116	70	80	98	56
% > 2.3 KG			17	25	25	12	12	13	15	10	7			

AREA=NAPARTOK

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
QUOTAS														
CATCH (KG)			28972	28039	8551	2486	752	291	16485					
EFFORT (MAN-WKS)			124	126	50	33	11	3	60					
C/E (KG)			234	223	171	75	68	97	275					
% > 2.3 KG			14	22	20	16	13	12	8					

AREA=HEBRON FIORD

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
QUOTAS									29072		20000			
CATCH (KG)				5957			2915	39901	37822		19531			
EFFORT (MAN-WKS)				37				106	98		112			
C/E (KG)				161				376	386		174			
% > 2.3 KG				16			19	34	23					

APPENDIX 1, ARCTIC CHARR CATCH STATISTICS, 1974-1987.
SUMMARY OF CATCH, EFFORT AND SIZE COMPOSITION

AREA=DOMES

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
QUOTAS														
CATCH (KG)								5187	2643		976			
EFFORT (MAN-WKS)								19	14		10			
C/E (KG)								273	189		98			
% > 2.3 KG								36	17					

AREA=SAGLEK FIORD

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
QUOTAS														
CATCH (KG)								24722	23791		5389			
EFFORT (MAN-WKS)								77	118		40			
C/E (KG)								321	202		135			
% > 2.3 KG								18	7					

AREA=RAMAH

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
QUOTAS														
CATCH (KG)									7758		3110			
EFFORT (MAN-WKS)									26		25			
C/E (KG)									298		124			
% > 2.3 KG									20					

AREA=NACHVAK

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
QUOTAS														
CATCH (KG)												6142	1808	
EFFORT (MAN-WKS)												18	4	
C/E (KG)												341	452	
% > 2.3 KG														
TRAP NET CATCH													1777	

AREA=NAIN FISHERY

	1974	1975	1976	1977*	1978	1979	1980	1981	1982	1983	1984	1985	1986**	1987
QUOTAS														
CATCH (KG)	120414	44118	134898	186165	213915	175263	167991	231221	203012	149732	123045	107120	99963	97379
EFFORT (MAN-WKS)	531	309	616	863	966	918	880	914	856	804	729	637	554	533
C/E (KG)	227	143	219	216	221	191	191	253	237	186	169	168	180	183
% > 2.3 KG			24	25	25	17	12	16	13	8	6			

* INCLUDES 186 KG UNACCOUNTED FOR BY AREA
** TOTAL ALSO INCLUDES TRAP NET CATCH FROM NACHVAK FIORD

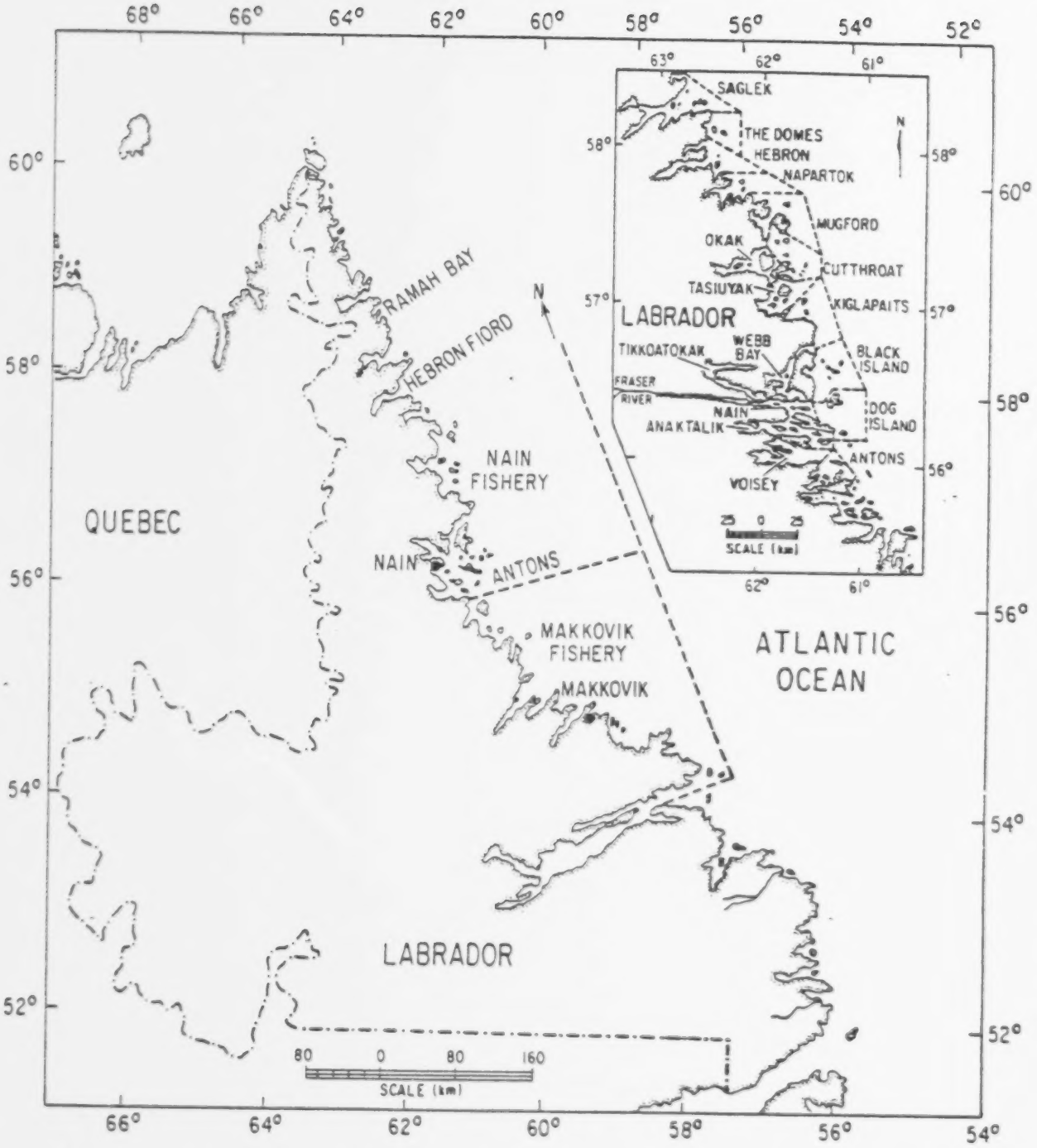

Fig. 1. Location of the Nain and Makkovik Fishing Regions in northern Labrador. Insert illustrates the location of subareas within the Nain Fishing Region.

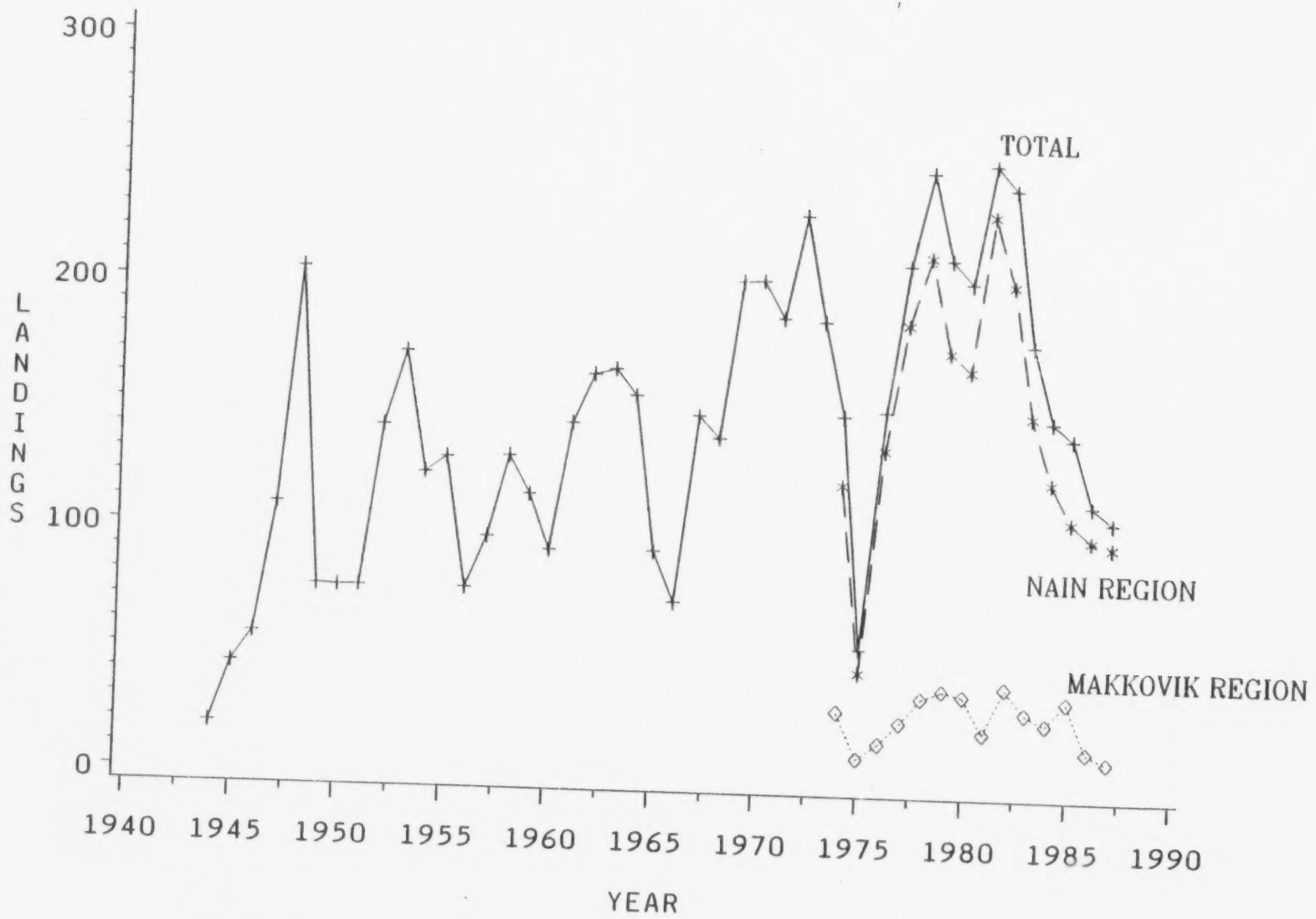

FIG. 2 SUMMARY OF NORTHERN LABRADOR ARCTIC CHARR LANDINGS (METRIC TONNES), 1944–1987